Test Report
Stability of Mix

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Job No	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Mix Type	Bituminous Macadam
Contractor	M/s KRIDL
Specification	Specification for Road & Bridge Works, MORT&H, Revision V.
Location	Bay
Sample No	3
Date	5-Jun-2018

Description	Unit	Test 1	Requirements as per MORT&H
Marshal Stability	KN	9.74	9 KN (min)
Marshal Flow	mm	3.4	2 – 5 mm
Percent of Air Voids in mix	%	4.4	3-5
Percent of Voids in Mineral Aggregates filled with Bitumen	%	73	65 – 75 %
Density	g/cc	2.21	2.22 g/cc

Note:

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Test Report

Moisture Content and Mix Gradation

	Improvement to roads and drains at Kogilu Layout at Ward No.05.
	Executive Engineer, Project Division Yalahanka
	TNRL/PMC/2017-2018/QR/04
	Specification for Road & Bridge Works, MORT&H, Revision V.

Description	Unit	Computation	Test Result
Crucible Empty Weight Correction (E)	gm	Eb	1080
Crucible + wet soil + filter paper correction (w_{sb})	gm	w_{sb}	1770
Crucible + wet soil - Empty Crucible (S_b)	gm	$S_b = w_{sb} - Eb$	690
Crucible + wet soil + filter paper correction (w_{sa})	gm	w_{sa}	1745
Crucible + wet soil (- washed aggregates) (S_a)	gm	$S_a = w_{sa} - Eb$	665
Crucible + Dry soil + filter paper correction (F_b)	gm	F_b	2
Crucible + Dry soil + filter paper correction (F_a)	gm	F_a	4
Dry soil + Filter paper (F_d)	gm	$F_d = F_b - F_a$	2
Wet soil + Filter paper (- washing) (W_b)	gm	W_b	25
Dry soil + Filter paper (- washing) (W_a)	gm	$W_a = w_b - F_d$	23
Moisture Content ($\%_{MC}$)	(%)	W_a/ SbX100	3.33

Weight Retained (gm)	Percentage of weight Retained (%)	Cumulative Percentage of weight retained (%)	Cumulative % of Passing		Remarks
			Test Result	Gradation Limits as per MORT&H	
0.00	0.00	0.00	100.00	100.00	Gradation satisfies the MORT&H Specification for Dense graded biyuminous macadam
465.00	4.65	4.65	95.35	90-100	
2135.00	21.35	26.00	74.00	71-95	
1638.00	16.38	42.38	57.63	56-80	
1650.00	16.50	58.88	41.13	38-54	
875.00	8.75	67.63	32.38	28-42	
1755.00	17.55	85.18	14.83	(7-21)	
688.00	6.88	92.05	7.95	(2-8)	

Test Report
Binder Content and Mix Gradation

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Job No	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Mix Type	Bituminous Macadam
Contractor	M/s KRIDL
Test Method	Specification for Road & Bridge Works, MORT&H, Revision V.
Location	Bay
Sample No	2
Date	6-Jun-2018

Description	Unit	Computation	Test Result
Weight of Empty bowl before Extraction (E)	gm	Eb	1080
Weight of bowl + Sample before extraction (w_a)	gm	w_{sb}	1775
Weight of Sample taken for the test (S_b)	gm	$S_b = w_{sb} - Eb$	695
Weight of bowl + Sample after extraction (w_a)	gm	w_{sa}	1751
Weight of Sample after extraction (i.e. washed aggregates) (S_a)	gm	$S_a = w_{sa} - Eb$	671
Weight of Filter paper before extraction (F_b)	gm	F_b	2
Weight of Filter paper after extraction (F_a)	gm	F_a	4
Weight of filler on filter paper (F_d)	gm	$F_d = F_b - F_a$	2
Weight of Bitumen without considering Filter paper (W_b)	gm	W_b	24
Weight of the Bitumen with considering Filter paper (W_a)	gm	$W_a = w_b - F_d$	22
Percentage of the Bitumen (i.e. Binder Content) ($\%_B$)	(%)	$W_a / SbX100$	3.17

Sieve size (mm)	Weight Retained (gm)	Percentage of weight Retained (%)	Cumulative Percentage of weight retained (%)	Cumulative % of Passing		Remarks
				Test Result	Gradation Limits as per MORT&H	
37.50	0.00	0.00	0.00	100.00	100.00	Gradation satisfies the MORT&H Specification for Dense graded biyuminous macadam
26.50	186.00	4.65	4.65	95.35	90-100	
19.00	854.00	21.35	26.00	74.00	71-95	
13.20	655.00	16.38	42.38	57.63	56-80	
4.75	660.00	16.50	58.88	41.13	38-54	
2.36	350.00	8.75	67.63	32.38	28-42	
0.30	702.00	17.55	85.18	14.83	(7-21)	
0.08	275.00	6.88	92.05	7.95	(2-8)	

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Test Report
Quality of Bitumen

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Concrete (BC)
	M/s KRIDL
	IS : 73 – 1992 & Specification for Road & Bridge Works, MORT&H,
	60 / 70
	Hot Mix Plant
	Bitumen
	1
	10-Jun-2018

Sl. No.	Description	Test Results	Requirement as per IS:73 - 1992
2	Penetration at 25^0C , 1 / 10 mm	64	60 – 70
	Softening Point, (^{0}C)	55	45 – 55
3	Specific Gravity	1.1	Min. 0.97
4	Ductility at 27^0C, in cm	83	Min. 75
5	Flash Point, (^{0}C)	187	Min. 175

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Test Report
Quality of Bitumen

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Concrete (BC)
	M/s KRIDL
	IS : 73 – 1992 & Specification for Road & Bridge Works, MORT&H,
	60 / 70
	Hot Mix Plant
	Bitumen
	2
	11-Jun-2018

Sl. No.	Description	Test Results	Requirement as per IS:73 - 1992
1	Penetration at 25^0C , 1 / 10 mm	66	60 – 70
2	Softening Point, (^{0}C)	52	45 – 55
3	Specific Gravity	1.1	Min. 0.97
4	Ductility at 27^0C, in cm	84	Min. 75
5	Flash Point, (^{0}C)	179	Min. 175

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Test Report
Rate of Spread of Tack Coat

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Concrete (BC)
	M/s KRIDL
	At Site
	Bitumen
	1
	13-Jun-2018

Sl. No.	Determination	Unit	Test No 1		
			Longitudinal Distribution		
1	Size of Plate (mxn)	m^2	0.2x0.2	0.2x0.2	0.2x0.2
2	Area of the Plate (a)	m^2	0.04	0.04	0.04
3	Initial weight of the empty Plate (b)	kg	1.641	1.641	1.641
4	Final weight of plate after application of Tack Coat (c)	kg	1.657	1.652	1.653
5	Weight of Prime coat/ Tack Coat (d = c-b)	kg	0.016	0.011	0.012
6	Rate of spread (d/a)	kg / m^2	0.400	0.275	0.300
7	Average	kg / m^2	0.325		
8	Specified Limit	kg / m^2	Not less than 0.25 kg / m^2		

Results: Rate of Spread of Prime Coat / Tack Coat is: 0.325 kg / m2

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Test Report
Rate of Spread of Tack Coat

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Work Order	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Work Type	Bituminous Concrete (BC)
Contractor	M/s KRIDL
Location	At Site
Material	Bitumen
Sample No	2
Date	14-Jun-2018

Sl. No.	Determination	Unit	Test No 1		
			Longitudinal Distribution		
1	Size of Plate (mxn)	m^2	0.2x0.2	0.2x0.2	0.2x0.2
2	Area of the Plate (a)	m^2	0.04	0.04	0.04
3	Initial weight of the empty Plate (b)	kg	1.641	1.641	1.641
4	Final weight of plate after application of Tack Coat (c)	kg	1.656	1.651	1.652
5	Weight of Prime coat/ Tack Coat (d = c-b)	kg	0.015	0.01	0.011
6	Rate of spread (d/a)	kg / m^2	0.375	0.25	0.275
7	Average	kg / m^2	0.300		
8	Specified Limit	kg / m^2	Not less than 0.25 kg / m^2		

Results: Rate of Spread of Prime Coat / Tack Coat is: 0.300 kg / m2

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Test Report
Rate of Spread of Tack Coat

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Concrete (BC)
	M/s KRIDL
	At Site
	Bitumen
	3
	13-Jun-2018

Sl.No.	Determination	Unit	Test No 1		
			Longitudinal Distribution		
1	Size of Plate (mxn)	m^2	0.2x0.2	0.2x0.2	0.2x0.2
2	Area of the Plate (a)	m^2	0.04	0.04	0.04
3	Initial weight of the empty Plate (b)	kg	1.641	1.641	1.641
4	Final weight of plate after application of Tack Coat (c)	kg	1.656	1.652	1.653
5	Weight of Prime coat/ Tack Coat (d = c-b)	kg	0.015	0.011	0.012
6	Rate of spread (d/a)	kg / m^2	0.375	0.275	0.3
7	Average	kg / m^2	0.333		
8	Specified Limit	kg / m^2	Not less than 0.25 kg / m^2		

Results: Rate of Spread of Prime Coat / Tack Coat is: 0.333 kg / m2

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Test Report
Rate of Spread of Tack Coat

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Concrete (BC)
	M/s KRIDL
	At Site
	Bitumen
	4
	14-Jun-2018

Sl. No.	Determination	Unit	Test No 1		
			Longitudinal Distribution		
1	Size of Plate (mxn)	m^2	0.2x0.2	0.2x0.2	0.2x0.2
2	Area of the Plate (a)	m^2	0.04	0.04	0.04
3	Initial weight of the empty Plate (b)	kg	1.641	1.641	1.641
4	Final weight of plate after application of Tack Coat (c)	kg	1.657	1.652	1.651
5	Weight of Prime coat/ Tack Coat (d = c-b)	kg	0.016	0.011	0.01
6	Rate of spread (d/a)	kg / m^2	0.400	0.275	0.250
7	Average	kg / m^2	0.308		
8	Specified Limit	kg / m^2	Not less than 0.25 kg / m^2		

Results: Rate of Spread of Prime Coat / Tack Coat is: 0.308 kg / m2

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Test Report
Rate of Spread of Tack Coat

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Concrete (BC)
	M/s KRIDL
	At Site
	Bitumen
	5
	14-Jun-2018

Sl. No.	Determination	Unit	Test No 1		
			Longitudinal Distribution		
1	Size of Plate (mxn)	m^2	0.2x0.2	0.2x0.2	0.2x0.2
2	Area of the Plate (a)	m^2	0.04	0.04	0.04
3	Initial weight of the empty Plate (b)	kg	1.641	1.641	1.641
4	Final weight of plate after application of Tack Coat (c)	kg	1.655	1.654	1.655
5	Weight of Prime coat/ Tack Coat (d = c-b)	kg	0.014	0.013	0.014
6	Rate of spread (d/a)	kg / m^2	0.350	0.325	0.350
7	Average	kg / m^2	0.342		
8	Specified Limit	kg / m^2	Not less than 0.25 kg / m^2		

Results: Rate of Spread of Prime Coat / Tack Coat is: 0.342 kg / m2

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Test Report
Rate of Spread of Tack Coat

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Concrete (BC)
	M/s KRIDL
	At Site
	Bitumen
	6
	14-Jun-2018

Sl.No.	Determination	Unit	Test No 1		
			Longitudinal Distribution		
1	Size of Plate (mxn)	m^2	0.2x0.2	0.2x0.2	0.2x0.2
2	Area of the Plate (a)	m^2	0.04	0.04	0.04
3	Initial weight of the empty Plate (b)	kg	1.641	1.641	1.641
4	Final weight of plate after application of Tack Coat (c)	kg	1.658	1.653	1.65
5	Weight of Prime coat/ Tack Coat (d = c-b)	kg	0.017	0.012	0.009
6	Rate of spread (d/a)	kg / m^2	0.425	0.3	0.225
7	Average	kg / m^2	0.317		
8	Specified Limit	kg / m^2	Not less than 0.25 kg / m^2		

Results: Rate of Spread of Prime Coat / Tack Coat is: 0.317 kg / m2

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Test Report
Aggregate Impact Value

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Concrete (BC)
	M/s KRIDL
	IS : 2386 (Part - 4) 1963 & Specification for Road & Bridge Works, MORT&H, Rev. V.
	At Site
	Coarse Aggregate
	1
	12-Jun-2018

S.No.	Determination	Unit	Trails	
1	Weight of empty cylinder, w1	gm	960	960
2	Weight of container filled with Aggregate, w2	gm	1306	1304
3	Weight of the Aggregate before compaction, (w2 - w1) = w3	gm	346	344
4	Weight of the sample passing through 2.36 mm IS sieves after Impact, w4	gm	82	82
5	Weight of the sample retained on 2.36 mm IS sieve after Impact, w5	gm	264	262
6	Aggregate Impact Value (w4 / w3)x100	%	23.70	23.84
7	Specified Limit	%	24	

Results: Average Aggregate Impact Value: **23.77** %

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relate only to the items tested.

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Test Report
Aggregate Particle Shape

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Concrete (BC)
	M/s KRIDL
	IS : 2386 (Part - 1) 1963 & Specification for Road & Bridge Works, MORT&H, Rev. V.
	Hot Mix Plant
	Coarse Aggregates
	1
	12-Jun-2018

IS Sieves Size		Weight of Retained Sample on Each Sieve (minimum 200 Pieces) (gm)	Flakiness Index		Elongation Index	
Passing through IS Sieves (mm)	Retained on IS Sieves (mm)		Thickness Gauge	Weight of Aggregates in each fraction passing on thickness gauges (gm)	Length Gauge	Weight of Aggregates in Fraction retained on length gauges (gm)
63	50	0	33.9	0	-	0
50	40	0	27	0	81	0
40	25	0	19.5	0	58.5	0
31.5	25	0	16.95	0	-	0
25	20	1555	13.5	235	40.5	253
20	16	1443	10.8	122	32.4	149
16	12.5	952	8.55	147	25.6	154
12.5	10	465	6.75	67	20.2	73
10	6.3	236	4.89	58	14.7	65
	SW	4651	SWf	629	SWe	694

Flakiness Index	13.52	%
Elongation Index	14.92	%

Combined Flakiness and Elongation Indices : 28.45 %

Comments: Maximum allowable Combined Flakiness and Elongation Indices for Bituminous Concrete is 35%.

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Test Report
Aggregate Stripping Value

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Concrete (BC)
	M/s KRIDL
	IS : 6241 - 1971 & Specification for Road & Bridge Works, MORT&H, Revision V.
	Hot Mix Plant
	Coarse Aggregates / Bitumen
	1
	12-Jun-2018
gregate	Coarse Aggregate
inder	60 / 70 Grade
of Binder Used	5% by weight
of Aggregate	200 gms
of Binder	10 gms
of water bath	40^0C

vation Number	Stripping Percentage	Average Percentage	Average Retained Coating (%)
1	3.5	3.53	96.47
2	3.5		
3	3.6		

Minimum allowable Aggregate Stripping Value for Bituminous Concrete is

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Test Report

Specific Gravity and Water Absorption

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Job No	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Mix Type	Bituminous Concrete (BC)
Contractor	M/s KRIDL
Test Method	IS: 2386 (Part - 111) 1963 & Specification for Road & Bridge Works, MORT&H, Rev. V.
Location	Hot Mix Plant
Material	Coarse Aggregates
Sample No	1
Date	12-Jun-2018

Particulars	Computations	Test Numbers		Mean
		Test 1	Test 2	
Weight of Empty Basket Immersed in Water	W_1 g	761	763	
water	W_2g	2024	2022	
Weight of Saturated Aggregate in water	W_sg = W_2- W_1	1263	1259	
Weight of saturated surface dry aggregate in Air	W_3 g	2059	2047	
Aggregate	W_3- W_s	796	788	
Weight of Oven dried Aggregate	W_4g	2020	2018	
Specific Gravity	W_4/(W_3- W_s)	2.54	2.56	2.55
Apparent Specific Gravity	W_4/(W_4- W_s)	2.67	2.66	2.66
Water Absorption	(W_4- W_3)*100/ W_4	1.93	1.44	1.69

Comments: Maximum allowable Aggregate Water Absorption value for Bituminous Concrete is 2.0%.

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